



Shelbyville, KY Stormwater Best Management Practices

January 2013

Residential Pollution Prevention		RHP-01 Non-Stormwater Discharges to Storm Drains
No Symbol	Symbol	
Description		<p>Citizens, residents and property owners of Shelbyville have the largest impact on the local streams and creeks. Most of the creeks, drainage channels and stormwater drains are located on private property. By eliminating pollution and protecting stormwater quality runoff, our streams and creeks will again support fish and other wildlife. It is important to protect stormwater quality since most city parks and recreation areas are located adjacent to streams, creeks, or karst features.</p> <p>The City of Shelbyville is required by the Kentucky Division of Water (KDOW) to reduce various types of pollution. KDOW issued a NPDES Phase II permit to the City of Bowling Green in 2003. Stormwater quality data is reported to KDOW annually. Illicit discharge detection and elimination (non-stormwater discharges) is a control measure regulated by the city.</p> <p>Design</p> <p>The principal goal of this BMP is to eliminate all substances (liquid or solid) that do not belong in stormwater. Severe penalties and fines can be assessed for each incident. Consult with the City of Shelbyville's Stormwater Ordinance for information regarding allowable and prohibited discharges.</p> <p>For more information on illicit discharges to stormwater drainage systems contact the City of Shelbyville Public Works Department, or visit the City website at:</p> <p>http://www.shelbyvillekentucky.com</p>



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Design (cont'd)

Illegal Discharges

Discharges into the Municipal Separate Sewer System (MS4) of an unapproved substance shall be considered an illicit discharge. This activity is regulated by City Ordinance. Contaminants include, but are not limited to the following:

1. Trash or debris
2. Construction materials
3. Petroleum products including but not limited to oil, gasoline, grease, fuel oil, or hydraulic fluids
4. Antifreeze and other automotive products
5. Metals in either particulate or dissolved form
6. Flammable or explosive materials
7. Radioactive materials
8. Batteries, including but not limited to, lead acid automobile batteries, alkaline batteries, lithium batteries, or mercury batteries
9. Acids, alkalis, or bases
10. Paints, stains, resins, lacquers, or varnishes
11. Degreasers and/or solvents
12. Drain cleaners
13. Pesticides, herbicides, or fertilizers
14. Steam cleaning wastes
15. Soaps, detergents, or ammonia
16. Swimming pool backwash including chlorinated swimming pool discharge
17. Chlorine, bromine, and other disinfectants
18. Heated water
19. Animal waste, either from domestic animals or from feeder lot operations
20. Leaking sanitary sewers and connections which have remained uncorrected for more than seven (7) days
21. Recreational vehicle waste
22. Animal carcasses
23. Food wastes
24. Medical wastes
25. Bark and other fibrous materials
26. Collected lawn clippings leaves, or branches
27. Silt, sediment, or gravel
28. Dyes expect with permission from the [Director]
29. Chemicals, not normally found in uncontaminated water
30. Washing of fresh concrete for cleaning and/or finishing, or to expose aggregates
31. Junk motor vehicles
32. Leading solid waste disposal containers
33. Sewage dumping or dumping of sewage sludge
34. Discharge of any polluted household wastewater, such as but not limited to laundry wash water and dishwater, except to a sanitary sewer or septic system
35. Leaking water lines which have remained uncorrected for seven days or more
36. Commercial, industrial or public vehicle wash discharge
37. Garbage or sanitary waste disposal
38. Dead animals or animal fecal waste
39. Dredged or spoil material



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40. Wrecked or discarded vehicles or equipment
41. Wash waters to the storm drain system from the cleaning of gas stations, auto repair garages, or other types of auto repair facilities
42. Wastewater to the storm drain system from mobile auto washing, steam cleaning, mobile carpet cleaning, and other such mobile commercial and industrial operations
43. Waters from areas where repair of machinery and equipment, including motor vehicles, which are visibly leaking oil, fluids or coolants is undertaken
44. Waters from storage areas for materials containing grease, oil, or hazardous materials, or uncovered receptacles containing hazardous materials, grease, or oil
45. Washing of toxic materials from paved or unpaved areas to the storm drain system
46. Discharge from the washing or rinsing of restaurant mats, roof vents, grease traps, equipment or garbage bins or cans in such a manner that causes non-storm water to enter the storm drain system
47. Sewage, industrial wastes, or other wastes into a well or a location that is likely that the discharged substance will move into a well, or the underground placement of fluids and other substances which do or may affect the waters of the state
48. Any hazardous material or waste, not listed above

The following non-stormwater discharges are explicitly prohibited by the Shelbyville Stormwater Ordinance. The list of prohibited discharges is not all-inclusive, as any type of discharge not specifically exempted (see list of items above) is prohibited. In other words, these are only the more commonly observed violations.

- Raw sewage discharges or overflows, including sanitary sewer overflows (SSOs).
- Discharges of wash water from the hosing or cleaning of gasoline stations, auto repair garages, or other types of automotive service facilities.
- Discharges resulting from the cleaning, repair, or maintenance of any type of equipment, machinery, or facility (includes motor vehicles, cement-related construction equipment, portable toilet servicing, etc.)
- Discharges of wash water from mobile operations such as steam cleaning, power washing, pressure washing, carpet cleaning, and mobile carwash facilities.
- Discharges of wash water from the cleaning or hosing of impervious surfaces in industrial and commercial areas including parking lots, streets, sidewalks, driveways, patios, plazas, work yards, and outdoor eating or drinking areas.
- Discharges of runoff from material storage areas containing chemicals, fuels, grease, oil or hazardous materials.
- Discharges of pool or fountain water containing chlorine, biocides or other chemicals, and also discharges of pool or fountain filter backwash water.
- Discharges of water containing sediment or construction-related wastes.
- Discharges of food-related wastes such as grease, oil, fish processing water, kitchen mat wash water, trash bin wash water, pouring liquids into dumpsters, etc. This includes disposing unwanted food or liquid into ditches, creeks or streams.



Residential Pollution Prevention		RHP-02 Vehicle Washing
No Symbol	Symbol	
Description		<p>Pollutants, such as detergents and dirty washwater, must always be prevented from directly discharging to streams, creeks, ditches and storm drains. Business and property owners can reduce pollutants from cars, trucks and other personal vehicles in order to protect natural streams and creeks. Every effort should be made to prevent pollutants from running off the land and impervious surfaces due to precipitation and stormwater.</p>
Design		<p>Washing personal vehicles (cars, trucks, vans, motorcycles, etc.) has a high potential for polluting streets, storm drains, streams, creeks, wetlands and other natural water bodies. Vehicles accumulate the various products and emissions generated by gasoline and diesel fuel combustion (particularly in the engine area and underneath the frame). The waste products from these vehicles include:</p> <ul style="list-style-type: none">➤ Fluids that leak slowly from the engine, or may escape from a rupture, or spill during a vehicle collision, such as engine oil, transmission fluid, radiator coolant, battery acids, and brake fluid all have special properties due to their chemical formulation. All of these fluids are toxic to plants and wildlife.➤ The moving parts of vehicles that typically wear down, such as pieces of worn tire, brakes and brake pads that erode and grind in a way to minimize vehicle maintenance, and especially those that containing asbestos and metals. <p>Detergents and cleaning substances are toxic to aquatic life. Reduce or eliminate the use of detergents and cleaners while washing vehicles. Wash vehicles on lawns or grassy areas to reduce direct discharge of washwater to curbs, inlets, ditches and other waterways.</p>



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Prohibition to Discharge	<p>Due to federal mandates, the City of Shelbyville has adopted an Ordinance to prohibit discharge of chemicals and manmade materials into creeks, streams, ditches, swales, pipes, storm drains, and parts of the city drainage system. See the BMP entitled RHP-01, Non-Stormwater Discharges to Storm Drains, for a complete list of allowable discharges; anything else is strictly prohibited. This prohibition includes all types of automotive fluids, whether discharged directly into a stream or storm drain, or discharged indirectly upon the ground surface. In addition to fines and legal action from the City of Shelbyville, the state government Kentucky Division of Water (KDOW) can also assess penalties for polluting waters of the state (defined as any blue-line stream on a USGS quadrangle topographic map) or any storm drainage system that leads to waters of the state.</p>
Vehicle Washing	<p>It is legal to discharge water when washing individual cars on residential property. This is one of the allowable discharges listed in RHP-01 (Non-Stormwater Discharges to Storm Drains) and in the Shelbyville Ordinance. It is also legal to discharge water when holding a carwash event over a period of two days or less, for the purpose of charity, nonprofit fundraising, or similar noncommercial purpose. However, it is illegal to discharge washwater or rinsewater that adversely affects the water quality of a creek or stream, even if otherwise allowable according to ordinance.</p> <p>Residents should attempt to minimize the amount of detergents that are used in washwater. Extremely dirty or grimy vehicles should generally be cleaned at a commercial carwash, which is required to treat all washwater and rinsewater to certain standards.</p> <p>A carwash or commercial vehicle washing facility is strictly prohibited from discharging water into streams, creeks, ditches, pipes, culverts or storm drains. This includes, but is not limited to: automobile dealers, automotive repair shops, industrial or commercial plants with vehicle washing stations, construction sites, or any location that is not a personal residence.</p> <p>City and County residents may want to wash vehicles on lawns or other pervious ground surfaces, or at least direct the discharge of washwater and rinsewater into grassy areas. Avoid discharging large amounts of chlorinated city water directly to storm drains or streams. Reduce the amount of chlorinated water by turning off the hose when not needed. Relatively small amounts of chlorinated water can be toxic to the fish and other aquatic organisms, especially during dry weather.</p> <p>Detergents affect the gill membranes of fish and adversely affect other aquatic life. Minimize the use of detergents, and dispose of soapy water indoors in a sink or drain. Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Avoid the use of solvents and other toxic chemicals.</p> <p>Do not wash engines, undercarriages, transmissions or automotive parts near streams, creeks, storm drains, ditches, or impervious surfaces such as driveways and streets. Carefully control and dispose of engine washwater in a manner that does not pollute Bowling Green streams or the environment. Dirty engines and undercarriages should generally be cleaned at well-equipped commercial facilities to prevent pollution.</p>



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Related BMPs Consult the following list of related BMPs for disposal options and other guidance:

- GHP-11 Vehicle and Equipment Washing
- RHP-01 Non-Stormwater Discharges to Storm Drains
- RHP-03 Vehicle Maintenance and Repair



Residential Pollution Prevention		RHP-03 Vehicle Maintenance and Repairs
No Symbol		
Symbol		<p>Description Pollutants and automotive fluids should be prevented from accumulating on impervious surfaces in order to improve stormwater quality and protect natural streams and creeks.</p> <p>Design Personal vehicles (cars, trucks, vans, motorcycles) have a high potential for polluting streets, grassy areas, streams, creeks, and the air that we breathe.</p> <ul style="list-style-type: none">➤ Vehicles contain large amounts of fluids that could leak slowly from the engine, or may escape from a ruptured hose. Fluids such as engine oil, transmission fluid, radiator coolant, battery acids, and brake fluid all have special properties due to their chemical formulation. All of these fluids are poisonous to plants, trees, insects, wildlife, fish, etc. and must be reduced or eliminated as much as possible. Repair automotive leaks immediately.➤ Incomplete combustion of gasoline and diesel fuels is a major contributor to air pollution. There is a high level of concern in state and federal governments for air quality and ozone levels throughout the country. Please keep personal vehicles in good condition to reduce air pollution. The Commonwealth of Kentucky currently does not require statewide vehicle inspections or emission testing. <p>Vehicles contain moving parts that wear down, such as tires and brake pads. Brakes and brake pads are designed purposely to erode and grind in a way to minimize vehicle maintenance. Small pieces of tires and brake pads (containing asbestos and metals) are continually being deposited on streets and roadways.</p>

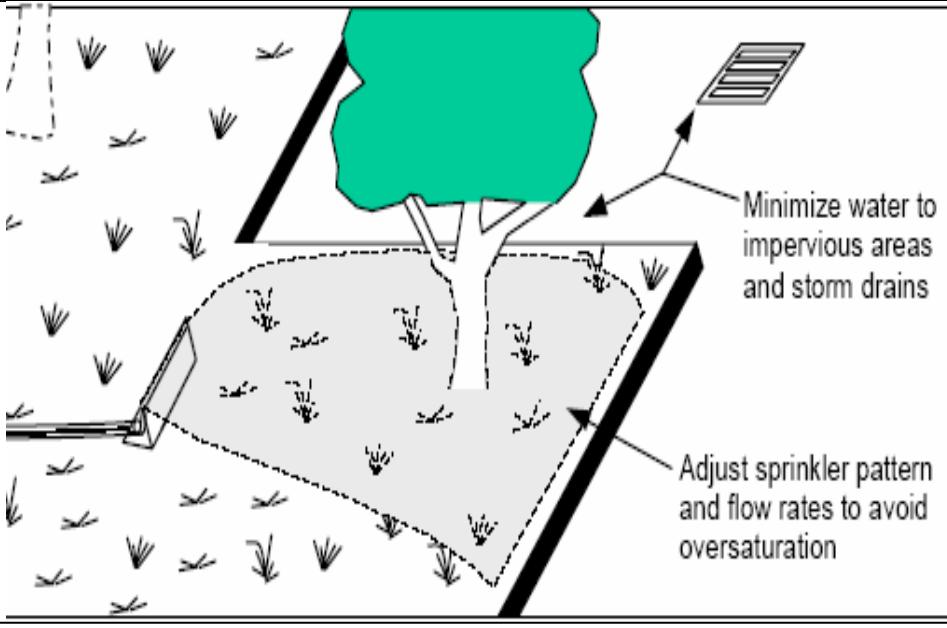


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Installation Procedures	<ul style="list-style-type: none">➤ Due to federal mandates, the City of Shelbyville has adopted a Stormwater Ordinance to prohibit discharge of chemicals and manmade materials into creeks, streams, ditches, swales, pipes, storm drains, and any surface which drains into these waterways. See the BMP entitled RHP-01 (Non-Stormwater Discharges to Storm Drains) for a list of allowable discharges; anything else is strictly prohibited.➤ One category of prohibited discharges included all automotive fluids, whether discharged directly into a stream or storm drain, or discharged indirectly upon the ground so that the automotive fluid could wash away as stormwater runoff at a later time. In addition to fines and legal action from the City of Bowling Green, the Kentucky Division of Water (KDOW) can also assess severe penalties for polluting waters of the state (defined as any blue-line stream on a USGS quadrangle topographic map) or any storm drainage system.➤ It is also illegal to discharge automotive fluids into a sinkhole, or to allow these fluids to soak into the ground. Sinkholes and known areas of groundwater recharge are also included as waters of the state, for which the KDOW, the City of Bowling Green and Warren County will assess penalties and take legal actions.
Disposal Options	<ul style="list-style-type: none">➤ Automotive parts stores and repair shops will typically accept engine oil and other fluids for recycling. Ask about recycling when you purchase automotive parts and fluids.
Vehicle Repairs	<ul style="list-style-type: none">➤ It is recommended that most city residents should take advantage of commercial repair shops and oil-change facilities. Home repair and maintenance may be performed if the homeowner/resident has adequate knowledge of materials to control spills and leaks, and proper safeguards to properly protect natural streams, storm drains, drainage ditches and the environment in general.➤ Purchase the correct automobile parts when making repairs or performing regular vehicle maintenance. Consult automotive repair manuals in order to perform the work quickly and efficiently. Use a funnel whenever pouring liquids such as motor oil, brake fluid or coolant. Drain hoses prior to removing or adjusting them; in most cases the liquid can be reused. Drain pans and drop cloths are essential items when changing oil or other automotive fluids. In general, use dry methods such as rags and absorbent material (kitty litter) to clean spills and leaks. Do not wash spills onto the ground or any surface that drains to the city stormwater drainage system or to natural creeks and streams. Sweep or mop any spills or leaks promptly. Keep spill containment materials nearby.➤ Use non-toxic materials when possible. For instance, baking soda is used for cleaning battery terminals and clamps. Do not mix used motor oil with solvents. Do not mix chlorinated solvents with non-chlorinated solvents such as kerosene or mineral spirits.
Maintenance	<p>The following GHP (Good Housekeeping Practices) BMPs are applicable to everyone who operates or maintains a vehicle such as businesses, industries, homeowners, automotive dealers, repair shops and garages, etc. They contain many specific requirements and guidelines for care and maintenance of vehicles.</p> <ul style="list-style-type: none">➤ GHP-05 Spill Prevention and Control➤ GHP-12 Vehicle and Equipment Fueling➤ GHP-13 Vehicle and Equipment Maintenance



Residential Pollution Prevention		RHP-04 Landscape Irrigation and Lawn Watering
No Symbol		
Symbol		
Description		Prevent or reduce the discharge of pollutants from sprinklers and landscaping water in order to protect natural streams and creeks. Runoff is reduced by decreasing the flow rate, applying water in a more controlled manner, and by closely monitoring sprinklers.
Design		<p>During dry summer months in the Bowling Green area, it is not unusual to go a few weeks without rainfall. Many homes and businesses determine that watering lawns and other vegetation is a necessity. In addition to lawns and trees, water is needed for golf courses, flower and vegetable gardens, nurseries and landscaped parking lot islands.</p> <p>Pollution occurs when landscaping water produces runoff to the storm drainage system. Typical pollutants include herbicides, pesticides, fertilizers, pet/animal waste and mulch. In addition, most watering is done with chlorinated utility water. Chlorinated water must not be discharged to Bowling Green's natural creeks, streams, because it kills aquatic life. Runoff from several over watered lawns will kill fish and other aquatic organisms in a small creek. Over watering is more likely to occur during the dry summer periods, which is when streams have lower flows and the chlorine dosages have more effect.</p> <p>Due to federal mandates, the City of Shelbyville adopted the Stormwater Ordinance to prohibit all discharges of chemicals, manmade materials and soils (see RHP-01, Non-Stormwater Discharges to Storm Drains) into streets, ditches, storm drains, and natural streams. This prohibition includes chlorinated water, any soil or mulch, chemicals such as fertilizers and pesticides, and nutrients such as fertilizer and lime. In addition to being toxic, these substances also change the pH and turbidity of natural streams and creeks. Damage from toxic materials is not necessarily immediate but can take months or years to accumulate.</p>



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Guidelines	<ul style="list-style-type: none">➤ Avoid discharging water onto impermeable surfaces such as paved driveways, roads and parking lots. Direct water onto soil and lawns by using a correctly sized sprinkler with the right spray pattern.➤ Lower the flow rate and increase watering time as necessary to avoid discharging water to the stormwater drainage system. Excess water damages the lawn or landscaped area by washing away the nutrients and soil.➤ Monitor watering activities and correct as necessary. Stop watering as soon as runoff leaves the landscaped area, which indicates saturated conditions.➤ Do not leave watering sprinkling activities unattended. Watering will be effective for a few hours, but the ground usually becomes saturated by nightfall. Afterwards, the sprinklers become ineffective and most of the chlorinated water goes directly to the stormwater drainage system.➤ Use herbicides, pesticides and fertilizers in accordance with manufacturer's instructions. Excessive use of these hazardous materials can be toxic to vegetation and wildlife in and near natural streams and creeks. Herbicides and pesticides should be applied after rainfall or watering occurs, and a dry period of a few days is expected. Fertilizer and lime may be applied prior to light watering.➤ Construct a small berm, depression area or curb on the lower side of landscaped areas. Minor grading modifications will allow excess water to collect and soak into the soil, instead of being wasted in the storm drains. Use native trees and shrubs when possible; native vegetation is usually more resistant to drought than ornamental trees.➤ If possible, avoid using chlorinated water for landscaping. Use rain barrels, cisterns, ponds or other methods for capturing stormwater. Or, allow chlorinated water to stand in an open container for a day or so, prior to being used for landscaping irrigation. Chlorine naturally escapes from chlorinated water as a gas, at a rate that is subject to temperature, sunshine and wind conditions. A simple swimming pool test kit can be used to detect chlorine. Once the dechlorination time has been established, further use of the chlorine test kit is usually not needed.
Maintenance	<ul style="list-style-type: none">➤ Monitor watering operations closely. Adjust watering rates and patterns to avoid runoff to storm drainage systems, curb inlets, ditches, natural creeks and streams, ponds, wetlands, etc. Repair damaged or incorrectly installed sprinklers. Repair leaking hoses and valves.
Limitations	<ul style="list-style-type: none">➤ Extra effort and attention is required to monitor landscape watering. Sprinklers and other equipment should have the correct size and configuration to accomplish the intended purpose without excessive watering.➤ Berms, curbs or other grading modifications will require additional space for ponding water. Berms and grading modifications may affect the symmetry of landscape designs in very minor ways.
Related BMPs	<p>Other topics and aspects of landscape irrigation and lawn watering are included in these related BMPs:</p> <ul style="list-style-type: none">➤ GHP-14 Employee / Subcontractor Training➤ GHP-15 Pesticides, Herbicides, and Fertilizer Use➤ EPP-10 Mulching➤ RHP-01 Non-Stormwater Discharges to Storm Drains



Residential Pollution Prevention		RHP-05 Pesticides and Fertilizers
No Symbol	Symbol	
Description	Design	<p>Use efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, herbicides, and pesticides. Misuse and overuse leads to stormwater pollution, poisons, and toxic substances in Bowling Green and Warren County creeks and streams. Only use fertilizers and pesticides when necessary, and consider alternative methods and treatments if available.</p> <p>Fertilizer management involves control of the rate, timing, and method of application to minimize the chance of polluting surface water or groundwater. Pesticide and herbicide management involves eliminating excessive pesticide use, using proper application procedures, and considering alternatives to chemical control to reduce the amount of pesticides and herbicides in stormwater runoff. The use of fertilizers, herbicides, and pesticides contribute to pollution of stormwater runoff. Residential users of these products tend to overapply by a factor of several times. Carefully read the instructions for application rates, recommended application equipment, and seasonal methods. See GHP-15 (Pesticides, Herbicides, and Fertilizer Use) for additional considerations and application instructions for various types of materials such as dusts, sprays, granular formulations and fumigants. In many cases, these products may not be essential for a productive lawn or garden. Selection of low-maintenance vegetation reduces the need for fertilizers, pesticides, and herbicides. University of Kentucky's Cooperative Extension Service has many brochures and pamphlets concerning fertilizers and pesticides, including various environment-friendly alternatives. These pamphlets are available online at: http://ces.ca.uky.edu/ces/</p> <p>More information on pesticides is available from the USEPA Office of Prevention, Pesticides & Toxic Substances: http://www.epa.gov/opptsmnt/</p>



Design
(cont'd)

Fertilizers

- Do not apply fertilizer when immediate rainfall is expected. Apply fertilizer only when there is already adequate soil moisture and little likelihood of immediate heavy rainfall. After applying fertilizer, lightly sprinkle the lawn or garden. A soil test is recommended to determine the optimum lime and fertilizer application rates.

Pesticides and Herbicides

- Excessive application and misuse of pesticides and herbicides results in heavily polluted stormwater runoff. Avoid using pesticides and herbicides when immediate rainfall is expected. Apply pesticides and herbicides in a narrow rather than wide band; do not broadcast them over the entire lawn area. Spot-spray infested areas. Never apply pesticides and herbicides near streams, creeks, ditches, storm drains or on impervious surfaces.
- Examine all alternatives to pesticides and herbicides that, in the long term, may be much less costly than the use of a particular chemical. Use the least toxic chemical pesticide or herbicide that will accomplish the purpose. Pesticides and herbicides that degrade rapidly are less likely to become stormwater runoff pollutants. Use pesticides and herbicides with low water solubility. Granular formulations are generally preferable to liquids because application losses are lower.
- Pesticides and herbicides should be sprayed only when wind speeds are less than 7 mph. Spray in the early morning or at dusk when wind speeds are usually lowest. Air temperature should range between 40° – 80° F.

Pesticide and Herbicide Types

- Dusts: This type is highly susceptible to wind drift, not only when being applied but also after reaching target. The application should be performed during the early morning or late evening hours when there is little or no air movement. The distance between the application equipment and the target should be minimized.
- Sprays: This type may be in the form of solutions, emulsions, or suspensions. Droplet size is an important factor in determining susceptibility to wind drift. Large droplets fall faster and are less likely to contaminate non-target areas. Sprays should be applied during periods of low air movement. Ground sprays followed by soil incorporation are not likely to be sources of water pollution unless excessive erosion occurs.
- Granular formulations: This type is applied to either the ground surface or below the soil surface. Surface applications may or may not be followed by soil incorporation. Pollution of surface waters from granular formulations is unlikely unless heavy runoff or erosion occurs soon after treatment. However, groundwater pollution may result from excessive leaching due to rainfall after application, depending on the pesticide composition. Loss of granular formulations can be controlled for the most part with adequate soil conservation practices.
- Fumigants: This type must be kept in place for specific lengths of time in order to be effective. Containment methods include soil compaction, water seal, and sealing of the area with a plastic cover. Most fumigants act rapidly and degrade quickly. Consequently, water pollution is usually not a problem.



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Design (cont'd)	<ul style="list-style-type: none">➤ Antimicrobial paints and other surface coatings: This type is designed to resist weathering and is therefore not a likely source of pollution. Empty containers should be disposed in accordance with rules for all pesticide containers. Use extreme care when sanding or scraping surfaces that have been previously treated with these substances. Treat sanded and scraped residue as hazardous waste.➤ Pre-plant treatments: Seed, roots, tubers, etc., are frequently treated with pesticides prior to planting. Treatment is usually by dust, slurry, or liquids. Little pollution hazard exists from this application. Care must be taken, however, in disposing of residual treatment materials and with unused plants.➤ Organic pesticides: A wide variety of organic pesticides, produced from plants, bacteria, and other naturally-occurring substances, are available in quantities for both commercial and residential use. These substances usually present much less risk for contamination of groundwater and surface water, and much fewer problems for disposal of leftover product or containers.➤ Beneficial insects: This management method involves the use of insects in bulk or in amounts suitable for residential use. It can be used alone or in combination with other pesticides to eliminate or minimize the use of toxic substances.
Good Housekeeping and Safety	<ul style="list-style-type: none">➤ Always use caution when handling any pesticide, herbicide, or fertilizer product. Many products contain toxic chemicals that cause severe injury or death. Keep pesticide or fertilizer products securely in containers protected from stormwater and away from children, pets, and sources of heat, sparks, and flames. Store products in their original containers and keep well-labeled. Do not store chemicals in food containers.➤ Read and follow use instructions provided on packaging, and in material safety data sheets (MSDS) if available. Periodically review for handling pesticides, herbicides, or fertilizers. Work only in well-ventilated areas. Avoid contact with eyes and skin. Wear gloves and eye protection when using or handling hazardous substances. Do not wear contact lenses, which can absorb hazardous vapors.
Disposal Options	<ul style="list-style-type: none">➤ Warren County sponsors an annual event for residents to disposal of chemicals and poisons used in their homes for free. Contact the Warren County Solid Waste Coordinator for more information.➤ In general, use the entire product before disposing the container. However, do not overapply the product if it is not needed. Do not dispose of pesticide or fertilizer wastes in any of the following methods:<ul style="list-style-type: none">▪ Into trash or waste containers▪ Into storm drains or into creeks▪ Onto the ground▪ By burning
Maintenance	<p>These related BMPs also provide guidance on the correct use and disposal of fertilizers and pesticides:</p> <ul style="list-style-type: none">➤ GHP-06 Waste Management➤ GHP-15 Pesticides, Herbicides, and Fertilizer Use



Residential Pollution Prevention		RHP-06 Household Hazardous Wastes
<i>No Symbol</i>		
<i>Symbol</i>		
Description	<p>Hazardous wastes exhibit one or more characteristics of ignitability, corrosivity, reactivity or toxicity which make it dangerous. When disposed of in the municipal solid waste stream or otherwise improperly managed, these materials have the potential of contaminating the ground water.</p>	
Design	<p>A typical home contains many hazardous chemicals commonly used for cleaning, repairs, construction, automobile maintenance, lawn care, or hobbies. Often, household hazardous waste will accumulate on shelves in the garage or basement. The basic definition for a household hazardous substance is that it is toxic, poisonous, corrosive, chemically reactive, flammable or combustible. Some examples of household hazardous waste include:</p> <ul style="list-style-type: none">➤ Adhesives➤ Ammonia or bleach➤ Anti-freeze➤ Automotive fluids➤ Batteries➤ Cleaning fluids➤ Detergents➤ Disinfectants➤ Herbicides <p>Due to poisons and toxic substances, household hazardous waste should not be included in the ordinary weekly garbage collection that is collected curbside. Contact the Warren County Solid Waste Coordinator for more information.</p>	



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Prohibition to Discharge	<p>Due to federal mandates, the City of Shelbyville has adopted a Stormwater Ordinance to prohibit discharge of all chemicals and manmade materials into creeks, streams, ditches, swales, pipes, storm drains, and any surface that drains into these waterways. See BMP RHP-01 (Non-Stormwater Discharges to Storm Drains) for a list of allowable discharges; anything else is strictly prohibited. This prohibition includes all types of fluids, whether discharged directly into a stream or storm drain, or discharged indirectly upon the ground. In addition to fines and legal action from the City of Shelbyville, the state government Kentucky Division of Water (KDOW) can also assess severe penalties for polluting waters of the state (defined as any blue-line stream on a United States Geological Survey (USGS) quadrangle topographic map), which also includes sinkholes and known areas of groundwater recharge.</p>
Disposal Options	<p>A household hazardous waste is any substance that is toxic, poisonous, corrosive, chemically reactive, flammable or combustible. The typical home contains many hazardous chemicals commonly used for cleaning, repairs, construction, automobile maintenance, lawn care, or hobbies. Oftentimes, household hazardous waste will accumulate on shelves in the garage or basement. The following items are not accepted at the Household Hazardous Waste Collection Center:</p> <ul style="list-style-type: none">➤ Ammunition and explosives➤ Medical waste➤ Radioactive waste➤ Unidentified materials <p>Whenever possible, purchase nontoxic and biodegradable products. Or use natural cleaning solutions such as vinegar or lye soap. Always follow the directions on the product label, and clean up any spills immediately. In general, do not purchase more of a hazardous product than can be reasonably used.</p>
Recycling	<p>Southern Recycling provides curbside recycling pickup in most areas. Participation in the recycling program is encouraged. Nearly 80% of all households participate in curbside recycling at least once per month. To receive more information about recycling check with the Warren County Solid Waste Coordinator.</p>
Related BMPs	<p>These BMPs have additional information about waste disposal and alternatives:</p> <ul style="list-style-type: none">➤ GHP-05 Spill Prevention and Control➤ RHP-01 Non-Stormwater Discharges to Storm Drains
References	<ul style="list-style-type: none">➤ www.shelbyvillekentucky.com➤



Residential Pollution Prevention		RHP-07 Sanitary Sewer Laterals & Septic Tanks
<i>No Symbol</i>	<i>Symbol</i>	
Description		<p>Property owners are responsible for the inspection, maintenance and repairs to the sanitary sewer laterals up to the connection with a sanitary sewer collector pipe. Those property owners on septic tank systems are responsible for maintenance and repairs to septic tank systems and associated drainfields.</p> <p>Design</p> <p>The definition of sanitary and septic waste includes, but is not limited to, the following items as listed in the Bowling Green Stormwater and Street Ordinance:</p> <ul style="list-style-type: none">➤ Human wastes➤ Wastewater from toilets, sinks, dishwashers, washing machines and other indoor plumbing fixtures➤ Wastewater from kitchens and restaurants➤ Wastewater from industries and commercial establishments <p>These types of wastes, as well as animal and pet wastes, carry harmful viruses and bacteria that spread disease. It is important to prevent direct and indirect human contact with these types of waste flows. Sanitary sewers are a vital part of American civilization and community health system but are seldom appreciated, noticed or maintained.</p> <p>Within the City of Shelbyville, most waste flows are discharged into sanitary sewers leading to wastewater treatment plants operated by the Shelbyville Municipal Water & Sewer Commission, SMWSC.</p>



Shelbyville, KY Stormwater Best Management Practices

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Design (cont'd)

Call SMWSC's phone number is 502-633-2840 for additional information on wastewater services, fee structures, request for service, etc.

SMWSC is located at 1059 Washington Street Shelbyville, KY, 40065. Their office hours are: 8:00 a.m. – 4:30 p.m. Monday – Friday.

Sanitary Laterals

At a minimum, property owners should be aware of where sanitary sewer laterals are found on the property. Do not allow heavy vehicles or construction equipment to drive on top of sanitary sewer laterals. Do not plant large trees directly over or near to sanitary sewer laterals. Large tree roots can infiltrate and eventually break a sanitary sewer lateral so that it will not function.

Inspection and Investigation

- The following guidelines are helpful for inspecting and maintaining sanitary sewer laterals. These guidelines will help the property owner to protect a valuable utility asset, and will help to improve water quality in Shelbyville creeks and streams.
 - Find location of sanitary sewer laterals on the property.
 - Find location of sanitary sewer lateral connection to the main sewer.
 - Determine approximate date of construction and materials used.
 - Inspect lateral locations regularly for unusual odor or ground wetness.
 - Inspect lateral locations regularly for subsidence or unusual soil color.
- A leaking sanitary sewer lateral may be contributing flow to a nearby storm drain, ditch or creek. Inspect the nearest storm drain or ditch during dry weather to determine if there is a suspicious flow. Contact the North Central Health District Offices to report illicit discharges, spills, leaks, or suspicious sanitary sewer discharges that need to be investigated. Anonymous calls are also handled.

Other Considerations

- All temporary and permanent connections to the municipal sanitary sewer system must be inspected and approved by SMWSC representative prior to installation. Contact the SMWSC Office for construction procedures and testing requirements. Only use licensed plumbing contractors with adequate experience and equipment for each project.
- Older houses throughout the City of Shelbyville may have illicit connections, where a sanitary sewer line discharges into a storm drain. There are many reasons that this may have occurred, including:
 - Standard practice 50 to 100 years ago, where sanitary sewers did not exist.
 - A building contractor may have misidentified the connection pipe honestly.



Shelbyville, KY Stormwater Best Management Practices

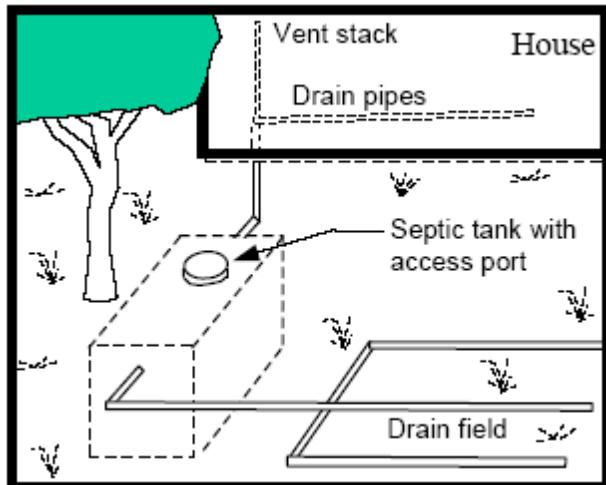
January 2013

Sanitary Laterals (cont'd)

- A building contractor may have taken a shortcut to save time & money.
- The storm drain contractor may have misidentified the sanitary sewer pipe.

➤ When found, cross connections must be replaced and repaired to function correctly. See [RHP-01](#) (Non-Stormwater Discharges to Storm Drains) for additional information on locating illicit discharges and cross connections. Smoke testing and dye testing are two common methods for SMWSC to locate leaks in the main sanitary sewer system.

➤ Roof drains for older houses typically are connected to the sanitary sewer system (standard practice 50 years ago). Current standard procedures for roof drainage call for roof drains and gutters to be disconnected from the sanitary sewer system. Roof drainage is relatively clean water that is discharged directly onto the ground.



Septic Tank Systems

➤ Existing privately-owned septic systems must be maintained in good working order. If a private septic system fails to function properly, then the owner may be required to hook into the municipal sanitary sewer system at their cost. Typically a septic tank needs to be inspected every year and pumped out every three years.

➤ Septic systems are not designed to process large volumes of water in short time periods. Do not wash several loads of clothes consecutively, and do not use excessive amounts of detergents that contain phosphorus. Do not pour household chemicals down the drain into a septic system; chemicals can kill the good microbes within the septic tank. Garbage disposals contribute to an overloading of solids in the septic tank, requiring more frequent cleanouts.

➤ Keep heavy equipment and vehicles away from septic tank and septic drain field. Do not compact soils in the septic field. Do not pave over the septic drain field. Adequate aeration and evaporation in drain field must occur for proper treatment.

➤ Inspect the septic tank and septic drainfield regularly to verify that sanitary and septic waste is not being discharged inadvertently. Inspection is normally done during dry weather to determine whether a discharge occurs. See [RHP-01](#) for methods to detect illicit discharges and leaks. Look for unusual odors, wet ground, discolored soil, subsidence or unusual settlement.



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Safety Concerns	<ul style="list-style-type: none">➤ Be careful investigating sanitary sewer lines or other confined spaces where sewer gases may exist. Sanitary sewer gases can render a person unconscious before being detected by normal senses. There are many instances of people being killed by falling unconscious into an open manhole due to sewer gases.➤ Methane gas, along with other sewer gases, is very explosive. Keep sparks and open flames away from sewers, manholes and septic tanks. Do not smoke near open manholes.
Related BMPs	<ul style="list-style-type: none">➤ GHP-10 Sanitary and Septic Waste Management➤ RHP-01 Non-Stormwater Discharges to Storm Drains



Residential Pollution Prevention		RHP-08 Pet and Animal Wastes
No Symbol	Symbol	 A black and tan Rottweiler dog is lying in a patch of green grass. The dog is facing right, wearing a pink collar. The background is a soft-focus view of more green grass.
Description Property owners should strive to prevent animal and pet wastes in or near natural streams and creeks, storm drains, sinkholes, ditches, swales or other types of stormwater conveyance systems. This will reduce the amount of bacteria (particularly fecal coliforms), which has been cited as concern for several creeks within the City of Bowling Green.	Design Sources of fecal coliforms include animals (such as pets, cattle, wild birds) and humans (failing sewers, straight pipes, improper disposal of food products). This BMP addresses animal wastes (domestic and wild) which are a significant source of water pollution. Animal waste may also contain other types of bacteria, viruses and parasites. When animal waste enters a natural creek, it uses the available dissolved oxygen to create ammonia. The combination of low oxygen, ammonia and warm temperatures is detrimental to the fish and other aquatic life. Animal waste contains nutrients that promote excessive weed and algae growth (eutrophication). Nutrients can make water cloudy and green, which further inhibits aquatic life and decreases the available dissolved oxygen. Due to federal mandates, the City of Shelbyville adopted the Stormwater Ordinance to prohibit and reduce pollution (see RHP-01, Non-Stormwater Discharge to Storm Drains) into streets, ditches, storm drains, and natural streams. This prohibition specifically includes animal wastes;	



Shelbyville, KY Stormwater Best Management Practices

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Guidelines	Pets
	<ul style="list-style-type: none">➤ Pets can be a very significant source of fecal coliform. A 1982 study of urban watersheds in Baltimore MD found that dog feces were the single greatest contributor of fecal coliform and fecal strep bacteria (reference 190). A single gram of dog feces can contain 23 million fecal coliform bacteria (reference 199). Dogs can also be hosts for Giardia and Salmonella, two common types of harmful bacteria (reference 191).➤ Provide a buffer zone and/or a fence to prevent animals from urinating or defecating into a creek, stream, or other stormwater drainage feature. Do not keep pets immediately adjacent to ditches, swales, storm drains, pipes or culverts.➤ Clean up yards or fields that contain pet wastes on a regular basis. Animal waste can be sent to the sanitary landfill as part of the regular weekly garbage pickup. Burying animal waste in the ground is also an acceptable option, away from ditches or stormwater channels.➤ Cat litter can be sent to the sanitary landfill as part of the regular weekly garbage pickup. Burying cat litter in the ground is also an acceptable option, away from ditches or stormwater channels. Dumping used cat litter in piles on the ground surface is not an environmentally approved practice.➤ When walking dogs, properly dispose of dog feces. Walk dogs in vegetated areas away from streams, creeks, ditches and drainage channels. Disposal options are:<ul style="list-style-type: none">▪ Scoop up pet waste and flush down the toilet.▪ Seal pet waste in a plastic bag and throw it in the garbage.▪ Bury pet waste in the yard (at least 6 inches deep) so it decomposes.▪ Add small quantities of pet waste to a compost pile; mix well. Make sure that pet waste is completely decomposed before using compost for gardens.
	<h3>Pastures / Farm Animals / Wildlife</h3> <ul style="list-style-type: none">➤ Provide a buffer zone and/or a fence to prevent livestock from urinating or defecating into a creek, stream, or other stormwater drainage feature. Do not keep animals immediately adjacent to ditches, swales, storm drains, pipes or culverts.➤ If it is necessary for pasture animals to cross a stream or creek, limit the access as much as possible. Discourage livestock from standing in a stream or creek by limiting shade.➤ Clean up pastures, fields, yards and other open areas that contain animal wastes on a regular basis. Keep compost piles and manure piles as far away from ditches or stormwater channels as possible. Burying animal waste in the ground is an acceptable alternative.➤ Do not encourage ducks, geese and other wild birds by feeding birds next to creeks, streams and ponds. Duck and geese waste products are particularly harmful to water quality for creeks and streams. Ponds with regular populations of ducks and geese may need additional water quality treatment, such as sand filtration units.



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Residential Pollution Prevention		RHP-09 Slope and Streambank Stabilization
No Symbol		
Symbol		
Description	<p>Property owners who stabilize eroding slopes and streambanks in order to protect ditches, swales, storm drains, creeks, lakes and natural waterways will not only improve the appearance of private property but will also substantially reduce sedimentation and flood damage. Streambank stabilization may require a permit from the Kentucky Division of Water (KDOW) prior to grading.</p> <p>See the KDOW website for more information at www.water.ky.gov.</p>	
Design	<p>Homeowners and private property owners can make a big difference in controlling erosion and sediment. The benefits of controlling erosion substantially outweigh the costs involved. Contrary to popular opinion, vegetation does not just grow by itself on disturbed areas and steep slopes. There is a large potential for eroding slopes wherever land is developed or landscaped in Bowling Green due to hilly topography and native clay soils.</p> <p>"Green" methods (with permanent vegetation) are the preferable means to fix steep slopes and erosion problems. Green methods help to capture rainfall, thus reducing the amount of runoff and flooding. Green methods are more attractive (and usually more durable) than structure stabilization methods such as gabion walls and riprap.</p>	



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Overview of Slope Stabilization	<p>First, determine the reason that a slope is unstable. If the slope tends to slide, collapse or slough, then the soil itself is unstable and typically needs a permanent solution. Possible remedies may include:</p> <ul style="list-style-type: none">➤ Planting hardier and more durable types of vegetation (native trees and vines)➤ Regrading the slope so that it is less steep.➤ Constructing a retaining wall, crib wall or other structural feature.➤ Divert surface water (and possibly groundwater) that tends to saturate soils and makes them heavier. <p>If a slope tends to erode or washout in certain spots then the problem may be a combination of inadequate ground cover, poor drainage, no topsoil, wrong plant or some other problem.</p> <ul style="list-style-type: none">➤ Divert surface water around the slope if possible.➤ Improve ground surface by adding topsoil, lime, fertilizer, or mulch.➤ Plant long grass, trees, shrubs, vines or another type of ground cover. Select plants that meet sunlight, drainage, and maintenance requirements. <p>Green methods involving permanent vegetation are preferable to non-green solutions. A common misconception is that gabions and riprap need to be inspected frequently for loose and misplaced stones, vegetation trimming and removal, settlement, etc. Green methods are more likely to be stable and self-maintaining. Specific aspects of slope stabilization are addressed in the following related BMPs:</p> <ul style="list-style-type: none">➤ EPP-13 Terracing➤ EPP-08 Surface Roughening➤ SMP-06 Bank Stabilization➤ SMP-07 Riprap➤ EPP-09 Topsoil➤ EPP-10 Mulching➤ EPP-05 Temporary Seeding <p>Retaining walls, crib walls and prefabricated structural walls must be designed by a professional or other qualified expert for specific site conditions. Walls which have a maximum height of at least 4 feet must be reviewed as part of a site development permit issued by either the City County Planning Commission or City of Bowling Green.</p>
Overview of Streambank Stabilization	<p>KDOW will require a property owner to obtain a Water Quality Certificate and/or a Floodplain Construction Permit for any grading in or near waters of the State. Here are two quick definitions used to specify waters of the State:</p> <ul style="list-style-type: none">➤ Shelbyville Engineering Department defines this as a blue-line stream on a USGS quadrangle map, or any point downstream from where a blue-line stream begins.➤ The KDOW typically defines a channel as carrying water for longer than one week after a heavy rainfall. The local KDOW office can send a field inspector to make difficult judgments when requested.



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Overview of Streambank Stabilization (cont'd)

The KDOW allows a property owner to clear downed trees and brush from a stream. The property owner should also unblock any culverts or pipes to prevent flooding. Live trees, shrubs, brush and other vegetation (when adjacent to channel) are usually necessary to anchor and protect streambanks. To complete this type of construction a property owner may be required to get a Floodplain Construction Permit and a Water Quality Certificate to ensure that Kentucky's water quality standards will not be violated. See the KDOW website for further information on permits, channelization, streambank protection, and allowable activities.

It is important not to alter the hydraulic stream cross sections. Changing the channel hydraulics at one location (flow width, flow depth, velocity, channel roughness) will affect the channel hydraulics elsewhere. Specific aspects of streambank stabilization are addressed in these related BMPs:

- SMP-06 Bank Stabilization
- SMP-08 Channel Linings



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Residential Pollution Prevention		RHP-10 Swimming Pools and Spas
No Symbol		
Symbol		
Description		<p>Chemical treatment of swimming pools and spas may prevent health concerns to bathers by killing organisms that live in the water. However, the chemicals that kill such organisms in pools and spas also kill aquatic life (fish, minnows, salamanders, crayfish) in creeks and streams that receive water with chemicals such as chlorine.</p>
Design		<p>Due to federal mandates, the City of Shelbyville adopted a Stormwater Ordinance to prohibit discharge of non-stormwater materials (see RHP-01, Non-Stormwater Discharges to Storm Drains) such as chlorine, Baquacil, and other treatment chemicals into streets, ditches, storm drains, and natural streams. Since a wide variety of pool and spa treatment chemicals exist, it would be impossible to address proper disposal methods for every available chemical used in the treatment of pool and spa water.</p> <p>The most common pool treatment is chlorine, which dissolves in water, then slowly released to the atmosphere as chlorine gas. This process is usually inhibited by the addition of other chemicals. Bromine is another type of pool chemical that is also commonly used. There are a variety of chemical products which are frequently used to reduce algae growth, adjust pH, remove hardness or metals, remove stains, etc. Shelbyville swimming pool and spa owners should use pool testing kits to monitor water conditions, and choose environmentally friendly products if available.</p> <p>Swimming pool water will naturally release chlorine gas at a rate that is dependent upon water and air temperature, presence of chemical inhibitors, amount of sunlight, amount of wind, water depth and circulation, etc. The process typically takes many days and requires that water should be periodically tested to monitor chlorine levels.</p>



Design
(cont'd)

Reducing or Eliminating Discharges

- Before buying chemicals, select a method of pool treatment that has been successfully used in the Shelbyville area. Investigate and compare products to ensure that a proven method is selected. Select a method with the least toxic chemicals or chemicals that can be easily neutralized and removed from water.
- Retailers and manufacturers must make information readily available to customers, such as material safety data sheets (MSDS), with each chemical product to cover proper use of chemicals, safety issues, and safe disposal methods. All users of pool and spa chemicals should verify that the discharge and disposal process for any water treated with chemical products will be able to comply with federal and state regulations in addition to the manufacturer's recommendation.
- Do not overfill swimming pools and spas so that water is discharged with every splash and wave. Allow adequate freeboard for rainfall and storms. Splashes and waves should drain to a grassy area for ground infiltration.

Recommended Disposal Alternatives

- Any swimming pool or spa water that has been treated by chlorine only and dechlorinated may be discharged to grassy yards, streets or stormwater systems at a controlled rate. Before discharging dechlorinated pool or spa water, check the water with pool test kit to verify that it is completely dechlorinated. Dechlorinated discharges to streets and driveways should occur in dry weather when it will not contribute to flooding neighbors who live downstream. Do not discharge water during winter months for safety reasons if there is a potential for water freezing in the streets, curbs and gutters.
- Any swimming pool or spa water that has been treated by chemicals other than chlorine is expressly prohibited from discharge to the storm drain system, even if the chemical has been neutralized. Disposal options include:
 1. Discharge to the sanitary sewer system.
 2. Drain pool and spa water at a very slow rate to grassy yards where the water will soak into the ground, and
 3. Construct an infiltration well or trench to allow water to soak into ground.
- The connection to sanitary sewer system must be approved by Shelbyville Municipal Water & Sewer Commission prior to discharging. Do not discharge water onto or through neighbor's yard or property. Infiltration rates in some soils can be slow. A percolation test may be necessary. An infiltration system may dissolve underlying natural limestone rock; geological information and advice should be consulted.
- Backwash water cannot be discharged directly to the stormwater system unless it is completely dechlorinated and not treated with any other chemicals. Typical disposal method for backwash is to connect backwash hose from swimming pool or spa to the sanitary sewer system using a licensed plumbing contractor to install backflow prevention devices.
- Note that any connections to sanitary system must be approved by SMWSC prior to installation. Call the BGMU or WCWD offices for more information.



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Limitations	Disposal methods that comply with the City of Shelbyville Stormwater Ordinance may not necessarily comply with federal, state, and county regulations. Resolve compliance issues prior to discharging water from swimming pool or spa.
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Residential Pollution Prevention		RHP-11 Boating
No Symbol	Symbol	
Description		<p>Prevent or reduce the discharge of pollutants to rivers, lakes and streams by proper disposal of wastes, minimizing repairs and maintenance, cleaning up spills and wastes immediately, and improved boating equipment and methods. Protect our natural resources and environment by following guidelines from the National Clean Boating Campaign. Use common sense to protect water quality of Shelbyville lakes and rivers.</p>
Design		<p>Federal, state and municipal regulations prohibit the discharge of any waste or litter into the surrounding lakes, streams, creeks or any of the various tributaries. Therefore, polluters may be penalized or arrested by any government entity authorized to enforce federal, state or municipal laws. It is illegal to discharge raw sewage from a vessel within U.S. territorial waters.</p> <p>In addition to government agencies and authorities, fishing organizations and tournaments promote responsible boating and care for the environment. Brochures and fact sheets from the National Clean Boating Campaign for sewage pumpout, fueling, bilge water, litter and boat maintenance are available at www.cleanboating.com/research/boatingpublic.html.</p>



Boating Activities

Boat Sewage and Pumpouts

- Properly dispose of domestic and sanitary wastewater by using holding tanks. Empty holding tanks at approved wastewater collection facilities at marinas and boatyards. Verify ballast water is clean before discharging to natural body of water. Remove or permanently lock Y-valve on holding tanks to prevent accidental discharge of untreated sewage to lakes, rivers and streams. Comply with all laws regarding use and maintenance of a marine sanitation device (MSD). Guidelines and regulations are summarized on a Coast Guard website (<http://www.uscg.mil/hq/g-m/mse/msd.htm>).
- In general, the use of onshore restrooms is preferable to using restrooms on a boat. Minimize the use of onboard facilities by using onshore restrooms when docked. Make restroom stops every few hours as needed. Plan for restroom stops at marinas, fueling stations, waterfront restaurants and public parks.
- Comply with all federal and state laws for MSD equipment. MSD equipment is regulated and certified by the U.S. Coast Guard to meet certain treatment standards. Type I and Type II MSD equipment is usually a combination of physical treatment (grinder) and chemical treatment (chlorinator) prior to discharge. Post operating instructions near the MSD, and keep MSD maintenance guide and user's manual on the boat.

<u>MSD</u>	<u>Fecal coliform limits</u>	<u>Discharge criteria</u>
Type I	< 1000 / 100 ml	No visible floating solids
Type II	< 200 / 100 ml	Suspended solids < 150 mg/l
Type III	-----	No discharge (holding tank)

- Do not use boat toilets for disposal of fats, solvents, oil, emulsifiers, paint, poison, disposable diapers or sanitary napkins. As a general rule, keep a supply of bags and containers ready for disposal of any conceivable item. Whenever possible, buy fast-dissolving marine toilet tissue for use in MSD equipment.
- Portable toilets shall not be discharged into U.S. territorial waters, which includes all lakes, rivers and streams within Kentucky. Empty portable toilets at shoreside dump stations or at home.
- Use a pumpout station to empty holding tanks (and also MSD Type III equipment). Encourage marina owners to construct more pumpouts and dump stations by thanking marina owners and supporting their businesses.

Fuel and Oil

- Prevent fuel and oil from being discharged into the water or into the bilge by every means available. Use oil-absorbent pads and booms to contain any spilled fuel or oil. Boats with inboard engines should have oil absorption pads in bilge areas. The pads should be changed at least once a year or as needed. Do not pump bilge water if it is oily or has a sheen.



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Boating Activities (cont'd)

- Fuel, fluids and oil should be kept in secure containers. Recycle used fuels in properly labeled containers. Inspect and repair engine valves, pipes, hoses as necessary. Use drip pans when conducting maintenance and repair.
- Keep engine and other equipment in good operating condition. Inspect engine prior to each use. Follow manufacturer's recommendations for maintenance and tune-ups. Use drip pans and funnels when performing minor engine repairs.
- Avoid filling the fuel tank to the top. Watch and listen when filling the fuel tank. Use fuel stations with automatic shut-off nozzles whenever possible.
- Notify KDOW and the City of Bowling Green or Warren County in the event of major leaks and spills (as described in [GHP-05](#), Spill Prevention and Control). Use oil-absorbent pads and booms to contain the spill. Do not use any detergent, soap, cleaner or emulsifier on a fuel spill, oil spill or bilge water. These substances temporarily dissolve oil and grease, but does not actually remove the pollution from the water.

Litter and Fish Waste

- Do not discharge anything into the water, including excess food. Place all litter and waste into trash bags for disposal onshore. Retrieve any trash which falls overboard.
- In general, reduce the amount of unnecessary wrapping and packaging used on the boat. Reusable containers, cups and dishes will reduce the amount of trash generated. Recycle whenever possible (aluminum cans, plastics, glass).
- Do not throw cigarettes (or other smoking materials) overboard. Use an ashtray when smoking. Do not spit chewing tobacco overboard.
- Do not discharge fish waste overboard. Place fish waste into trash bags for disposal onshore, or use a fish cleaning station onshore. Small amounts of fish parts may be used for bait or chum. Fish wastes should not be recycled in any dead-end lagoons or other poorly flushed areas. Restaurants are specifically prohibited from discharging fish wastes into the water.
- People participating in fishing tournaments and other authorized events should follow guidelines presented by the sponsors. Follow all rules and regulations issued by the Kentucky Department of Fish and Wildlife.

Boat Cleaning and Maintenance

- Plan all cleaning and maintenance activities beforehand. Use the proper equipment to perform the activity efficiently and swiftly, while minimizing pollution. Use phosphate-free and biodegradable detergents for hull washing. Limit the amount of detergents used by first scrubbing and cleaning with water.



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Boating Activities (cont'd)	<ul style="list-style-type: none">➤ Perform all hull scraping, sanding, chemical stripping and painting onshore. Place boat over a drop cloth, and prevent the discharge of any chemicals or particles. Properly dispose of surface chips, used blasting sand, residual paints, and other materials. Use temporary storage containment that is not exposed to rain. Sweep dry-docks each day or after maintenance is completed.➤ Limit over-water hull surface maintenance to minor sanding and minor painting using hand tools and a small can of paint or other surface agent. In general, conduct most boat repair and maintenance items by removing the boat from the water into an organized maintenance area.➤ Painting should be limited to spot work. Paint mixing should not occur on the dock. Use secondary containment on paint cans. Have available spill containment and cleanup materials. Use tarps, ground cloths or plastic sheeting when sandblasting or painting boats on land. Spray applicators may be used when painting on land.➤ Immediately clean up spills on docks or boats using absorbent materials. Keep ample supply of spill cleanup materials on hand and conspicuously marked.➤ Dispose of cleanup materials properly. Consult GHP-05 (Spill Prevention and Control) for emergency telephone numbers.
Limitations	<ul style="list-style-type: none">➤ Private tenants at marinas may resist restrictions on shipboard painting and maintenance. Existing contracts with tenants should be updated to require that tenants abide by new rules that benefit water quality.➤ Even small amounts of biodegradable cleaning agents have been found to be toxic to fish. Disposal of small amounts of cleaning agents should be done through the sanitary sewer system.
Links	<ul style="list-style-type: none">➤ National Clean Boating Campaign http://www.cleanboating.com/research/boatingpublic.html➤ National Clean Boating Campaign http://cleanboating.org/bibliography/index.html



Residential Pollution Prevention		RHP-12 Tips for Wet Basements and Crawlspaces
No Symbol	Symbol	<p>WET BASEMENT AND CRAWL SPACE PROBLEMS, CAUSES AND REMEDIES – TIPS FOR HOMEOWNERS AND HOME BUYERS</p> <p>The primary purpose of this BMP is to inform the homeowner, home buyer, and home builder about the usual causes for wet basements and crawl spaces, plus effective measures for preventing or correcting problems. This information can enable the public to build, select, or repair homes wisely. Although this BMP is not directly connected with water quality and stormwater pollution, the matter of wet basements and crawl spaces is closely related to stormwater design, landscaping, and minimizing contact with stormwater.</p>  <p>Immediate & Long-Term Problems Causes of Wet Basements and Crawl Spaces Preventing Wet Basements and Crawl Spaces Tips for Homeowners and Home Builders</p>
Immediate and Long Term Problems	<p>Standing water or seepage inside residential crawl spaces and basements can cause frustrating problems for the homeowner. These problems can be both immediate and long-term. For example, standing water and mud inside crawl spaces make it very difficult and messy to gain access under the house for inspecting, maintaining, and servicing electrical circuits, drains and water lines, heating and air conditioning, and other utilities. Wet basements and crawl spaces are sources of high humidity, which can produce surface condensation, mildew and fungi, musty odors, and an unhealthy environment. Such moisture can cause deterioration of floor joists, beams, subflooring, insulation, and electrical-mechanical systems. Prolonged water around the footer and foundation wall can soften the soil and weaken its bearing capacity, increasing the possibility of wall settlement and cracking. Serious seepage under the foundation footer may erode soil away and cause sinkhole collapse. Excessive moisture can eventually penetrate the subflooring and buckle the flooring or cause warping, making doors and cabinets difficult to close or open. Since crawl space or basement dampness always moves toward the drier upstairs areas, higher humidity will result in costlier heating and air conditioning bills. In the case of crawl spaces, if the underflooring insulation collects moisture, or sags from excessive wetness, the heating and air conditioning costs are driven even higher.</p> <p>Finally, wet basements and crawl spaces reduce the value of the house – at least by the amount that would be required to repair the damage and to eliminate the cause of the problem. Homeowners in these situations should immediately seek professional assistance in assessing the source and extent of the problem and in finding a remedy.</p>	



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Cause of Wet Basements and Crawl Spaces

Most wet basements or crawl spaces are caused by surface water that is not adequately drained away from the foundation wall. Sources of this water may include the following:

- Roof water, if no guttering is present or if the guttering leaks and overflows due to leaves and obstructions. Concentrated roof water, when falling from a height of one or two stories, can cause erosion along the foundation wall and exacerbate the problem of stormwater infiltration.
- Roof water, if the downspouts are clogged or do not have sufficient means to drain water away from the foundation wall. Frequently, a downspout ends at the corner of the house without a splash pad (splash block) or shoe (sometimes called an elbow), leaving roof water to concentrate at that point and seep into the soil next to the foundation wall. A typical 2000 square foot roof can produce almost 1250 gallons of water during just 1 inch of rainfall. If rainfall is steady and prolonged, roof water is even more likely to soak into the ground next to the foundation wall.
- Excessive watering of flower beds and shrubbery around the foundation wall. Once the upper soil layer or mulch bed is filled with water, the excess water either runs off or seeps into the ground next to the wall. Prolonged watering can contribute large amounts of water to crawl spaces or basements.
- Rainwater runoff from the adjacent lawn, walks, or driveway areas if the landscaping slopes water to drain toward the house instead of away. If surface runoff is directed toward foundation wall, water will pond and then soak into the soil, thus becoming a potential source of basement or crawl space water. Downspout splash pads are not very effective if the lawn drains back to the foundation wall.

Water or dampness problems in basements or crawl spaces are sometimes caused by other factors:

- Subsurface or groundwater may be intercepted or dammed up by a basement or foundation wall. Houses which are built on a hillside are particularly vulnerable. Foundation walls act like dams to intercept and trap this subsurface water, causing pressure to build up on the outside of the wall, which forces water through joints and cracks in basement walls or as seepage under the footer.
- Nearby springs may have been filled in or covered up by others. Unless the springs were properly drained away from the lot or subdivision, such water will eventually seep into the surrounding fill, become a pool of groundwater, and eventually force itself laterally and upwardly into basements and crawl spaces.
- Nearby creeks may overflow during storm runoff and either directly flood basement or crawl space areas, or contribute to the groundwater, which may become sufficiently high to cause seepage into the basement or crawl space area. Homeowners may not experience the effects of groundwater seepage or overflowing creeks for months or years after purchasing a house because of drought or infrequent out-of-bank flooding. However, when such conditions do occur, they may come suddenly without warning and cause serious problems after the warranty period has expired.



Cause of Wet
Basements
and Crawl
Spaces
(cont'd)

- Improperly installed, clogged, collapsed, or leaky drains may not allow water to escape. Perimeter, footer, or foundation drains are installed around the exterior of a house below basement floor level to intercept groundwater buildup and seepage under the house. If drains are improperly installed or become clogged with silt or roots, they will not operate as intended. Sometimes an otherwise good perimeter drain gets covered up or crushed during the final backfilling or landscaping stages of construction, and the intercepted water will backup into a foundation wall and eventually seep into the basement or crawl space.

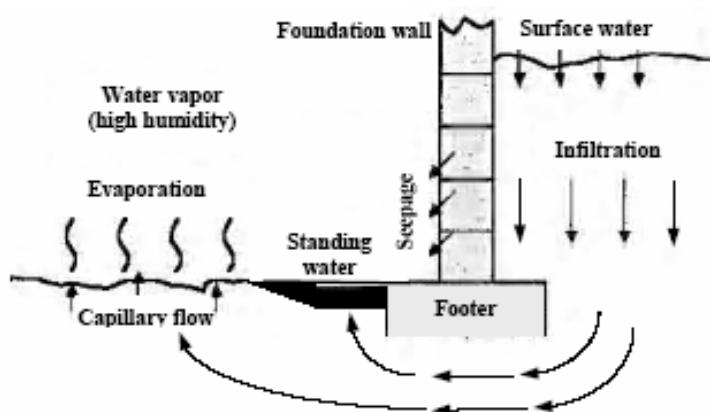


Figure 1. Typical paths of water and moisture entering into a crawl space area.

- Soil continuously draws water up from subsurface groundwater sources in a crawl space by capillary attraction. The finer the soil (e.g. clays), the more aggressive the capillary pumping action. As the water rises to the surface, it evaporates into the crawl space. This ground moisture is a significant source of dampness and humidity under a house, even without standing water. The presence of capillary water is often indicated by a whitish residue, left on the ground surface of the crawl spaces, resulting from evaporation of water containing minerals and salts. Lack of a moisture barrier, such as a plastic sheet, will allow capillary action and evaporation to contribute unlimited moisture to crawl space areas. Figure 1 illustrates how surface water and moisture can enter a crawl space area.
- Closed, inadequate, ineffective, or no crawl space venting around foundation walls will force the buildup of humidity in the space beneath a house. Given the combination of high humidity and low temperature, condensation can form on heating/AC ducts, joists, underflooring, and insulation. This environment, together with likely darkness, encourages mildew and other fungi to form.



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Cause of Wet Basements and Crawl Spaces (cont'd)

- Damp or wet basements and crawl spaces may be caused by ruptured water or sanitary lines either just outside the wall or under the house. If a crawl space is unusually wet and muddy, inside leaks may be difficult to find and repair. Outside pipe leaks may be even more difficult to find, since water may appear several feet away from the actual leak. Old field drains under a house may also be a source of unwanted water.

Preventing Wet Basements and Crawl Spaces

Many construction complaints about new homes arise from inadequate site drainage and water problems. Proper drainage of surface water is a primary element in preventing wet basements, damp crawl spaces, eroded banks, muddy yards, and possible failure of a foundation system. The City of Shelbyville requires that new construction or alteration of houses must conform to the requirements of the current building codes. Generally, surface water drainage should be directed from all sides of the house and off the lot in a manner that will:

- Minimize possibility of dampness in basements and crawl spaces.
- Prevent standing or ponding water on the site.
- Prevent soil erosion.
- Not adversely affect the supporting foundation soil behavior.

Walks, driveways, retaining walls and other landscape improvements should be constructed so as not to interfere with drainage. Walks should not be used as drainage channels. Site grading plans should specify minimum slopes from the house (usually 2 to 5%), depending on location, type of soils, frost depth, and soil moisture, to ensure water drainage for some specified distance (usually 6 to 25 feet) away from supporting foundations. In cases where minimum slopes or distances cannot be attained, paved gutters or other drainage structures acceptable to the Building Inspector may need to be installed. Maximum slopes are specified to prevent erosion or unstable banks around the house and yard.

Roof water should be directed to a downspout and away from the foundation wall toward a suitable ditch, swale, or drainage pipe to prevent ponding or backflow as shown in Figure 2. All drainage structures should be properly connected to adequate outlets that are protected, where necessary, by recorded permanent easement.

House plans and landscaping should be developed to prevent "dead" drainage areas around the foundation wall -- areas where rainfall has no place to flow away except by ponding and soaking into the soil near the foundation wall. Areas bounded by the front entrance / sidewalk/garage / driveway are especially vulnerable to trapped pockets of surface water.



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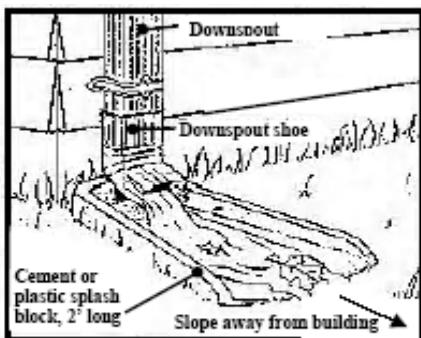


Figure 2. Correct installation of downspout shoe and splash block at foundation wall.
(Note that the ground surface slopes away from house.)

Another vital step in preventing water in basements and crawl spaces is to intercept outside subsurface or groundwater with a perimeter drain at the footer base level around all sides of the house where the exterior ground surface is higher than the inside floor or crawl space level. While foundation drains are clearly necessary for houses with basements or potentially habitable living space below exterior ground surface, they may also be used in crawl spaces where water, soil, and/or earth floor elevation conditions warrant. The drains should discharge by gravity to a positive outfall such as an approved drainage ditch, swale or storm system. In some cases, sump pits and pumping with automatic float actuation may be required.

Specifications for waterproofing and damp-proofing foundation walls are found in building codes. Building codes specify the materials, maximum vapor transmission rate, venting, etc., appropriate for construction. Excessive moisture vapor can be prevented from entering a crawl space area with the use of an effective and correctly installed vapor barrier (typically polyethylene sheeting) over the ground surface. Torn pieces, poor or non-overlapping joints, missing sections, or improperly sealed corners and edges at the walls, fireplaces, and interior piers must be avoided to produce an effective vapor barrier.



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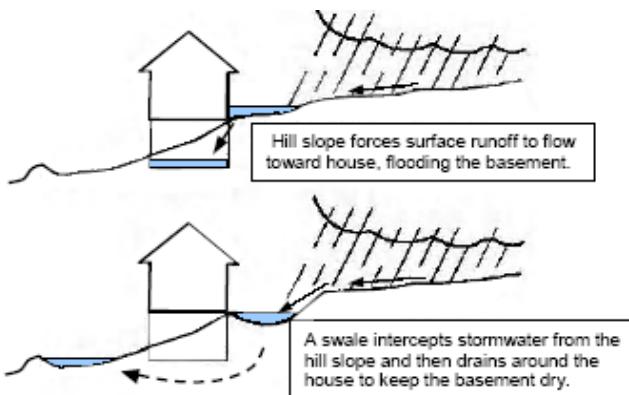


Figure 3. Correction of typical slope drainage problem using swale or ditch.

Crawl space areas should have adequate wall ventilation openings around the foundation walls to provide cross ventilation for preventing the buildup of water vapor inside the crawl space. Building codes specify minimum vent opening areas (usually 1 square foot of net opening for each 150 square feet of crawl space), opening location or arrangement, corrosion-resistant wire mesh screen, and any reduction in ventilation opening area allowance if an approved vapor barrier is used.



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Preventing Wet Basements and Crawl Spaces (cont'd) In older houses where any of the above moisture control methods are missing, measures should be taken to install appropriate drainage facilities, vapor barriers, or ventilation openings. Installing any of these elements after a house has been built will be more costly than while the house is constructed. A combination of remedial measures is often necessary. If the yard area slopes toward the house and surface water collects or ponds near the foundation wall, a V-ditch or swale should be constructed around the house to allow surface drainage from both the foundation wall and the other yard areas to an adequate ditch or storm drain. Such cases often exist where the front street is higher than the first floor of the house, or when the house is built on the side of a hill. Figure 3 illustrates how this problem can be solved.

If a flower bed or garden is next to the foundation wall, it may be a significant source of water for the basement or crawl space. Consider relocating the flower bed or shrubbery, or install heavy plastic sheets with drains beneath the flower bed. Then any water which soaks deeply into the soil is intercepted and carried safely away by gravity at least six to eight feet from the house to a gravel collection drain or swale.

Tips for Homeowners and Homebuilders "A teaspoon of prevention is worth a gallon of cure" certainly applies to new homebuilders – at least in avoiding water problems in basements or crawl spaces. Buyers of new or older houses should be cautious about drainage. The best time to sign a contract is on a rainy day!"

Work with a professional to help locate the new house on the lot and at an elevation which minimizes the potential for surface or groundwater drainage problems. If a flowing stream or creek is nearby (especially if bordering the lot), check with local planning agency authorities or a hydrologic engineer for potential flooding, whether in a designated 500-year flood hazard zone or in an area where that may be affected by nuisance flooding.

Tips for buying or building a new house

The following tips are suggested to avoid water problems when building or buying a new house:

Work with a reputable homebuilder that can supply reference names and projects for houses that he has built. Visit these sites and check for patterns of any drainage problems. Contact the Better Business Bureau and other organizations to see if there are complaints and outstanding issues.

It may be beneficial to hire an engineer or architect to check slopes, foundation wall waterproofing and dam-proofing, underground drains, general surface and roof water drainage, and general quality of construction. If you suspect a potential problem, ask the local building inspector for advice.



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Tips for Homeowners and Homebuilders (cont'd)

Check to make sure that the perimeter foundation drain, basement drain, or crawl space drain has an unobstructed outlet to a ditch or swale leading away from the house. Pay special attention around the outside and the basement or crawl space for: (1) back sloping lawns and landscaping toward foundation walls; (2) back sloping driveways toward garage, stoops, walks or patios which force surface water toward the foundation wall; (3) very flat property; (4) standing water inside of crawl space next to foundation wall; (5) pattern of wet concrete blocks inside basement walls, particularly with whitish salt deposits on inside foundation walls as a result of leaching from moisture seepage and evaporation; (6) downspouts which drain to the foundation wall without any clear path for water to escape; and (7) depressions or settlement near the foundation. If necessary, use a level to check the slope direction.